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Analysis of biology candidate teachers' self-efficacy beliefs on environmental education

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Abstract

The aim of this study is to investigate candidate biology teachers' self-efficacy beliefs of environmental education in terms of different variables. The study was of descriptive survey design. The sample comprised candidate teachers studying in Gazi University, Gazi Faculty of Education, Biology Teaching Department in the educational year of 2010-2011. Data were collected through "Environmental Education Self-Efficacy Belief Scale" devised by Enochs & Riggs (1990), adapted to environmental education by Sia (1992) and adapted to Turkish by Savran & Çakıroğlu. The primary results obtained in the study might be summarized as follows: the candidate biology teachers' self-efficacy beliefs on environmental education is at over medium level while environmental education beliefs did not vary significantly in terms of gender while they varied significantly in terms of class level. Environmental self-efficacy belief levels were found to increase as the class level increased.

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Keywords: Environmental education, Self efficacy, Biology candidate teachers

1. Introduction

Self-efficacy is defined as people's judgment about their own capacity to manage activities necessary to perform at a certain level, and their ability to carry out these activities successfully (Bandura, 1986). Self-efficacy belief is one of the most important factors that influence a person's ability to initiate a task and to succeed at it. Self-efficacy belief is a product of a comprehensive assessment and judgment of a person's own capabilities. A person first scrutinizes the talents and abilities, personality traits, level of knowledge and experience, and the degree of motivation that he has in order to be able to meet the demands of the circumstances, and then decides to act if he believes that his capabilities are sufficient to meet the performance demands of the task, activity or situation at hand (Işık, 2001).

Self-efficacy beliefs can affect the level of performance positively or negatively due to their impact on the affective, cognitive and motivational regulation processes. People with high level of self-efficacy beliefs can visualize success scenarios that produce positive alternatives for better performance, and determine the best solutions for potential problems. People who perceive themselves as lacking in self-efficacy, on the other hand, tend to imagine scenarios of failure, and they would think how things might go wrong (Bandura, 1986).

Environment is defined as the circumstances and conditions that surround living organisms. Living organisms and the environment that surrounds them are in constant interaction through which they affect each other in various ways. Environment for living organisms is the surroundings in which they perform all kinds of social, biological,

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cultural, and economic activities, and through which they meet their needs to maintain life such as nutrition, reproduction and shelter. Environment includes not only all living beings and inanimate objects, but also the physical, chemical and biological factors that influence them (Yıldız, Yılmaz & Sipahioğlu, 2004).

Environmental education leads to an increase in social awareness and sensitivity, the production of knowledge necessary for the protection of the environment, and the inquiry into methods necessary for tackling environmental problems (Dresner & Blawner, 2006). Environmental education ensures the training of individuals who assume responsibility in equipping people with skills necessary to manage the natural resources and the environmental treasures of the earth in a sustainable manner (Kavruk, 2002).

Teachers are important elements in environmental education. Teachers' self-efficacy beliefs affect both their own and their students' performances. Teachers with high levels of self-efficacy beliefs put forth more effort into teaching; they are generally more enthusiastic about teaching; and they are more successful in adopting the right teaching and learning techniques (Hoy & Woolfolk, 1993). For environmental education to be effective, first of all, teachers need to have high levels of self-efficacy beliefs in this subject matter. Accordingly, the purpose of this study is to investigate prospective teachers' self-efficacy belief levels in environmental education.

2. Aim

The present study investigates the self-efficacy belief levels of prospective biology teachers in environmental education. To this end, the following research questions have been posed:

1. What is the level of self-efficacy beliefs of prospective biology teachers in environmental education?
2. Are there any sex differences in prospective biology teachers' self efficacy beliefs in environmental education?
3. Do the levels of self-efficacy beliefs of prospective biology teachers' in environmental education show meaningful correlation with the variable of the number of years in training?
4. Do the levels of self-efficacy beliefs of prospective biology teachers' in environmental education show meaningful correlation with the variable of membership to an environmental organization?

3. Method

This study has been designed in the form of a survey.

3.1. Sample

The sample group for this study was selected from 61 teacher candidates in the last year of their studies at the Biology Education Department in Gazi University, Faculty of Education. The sample group consists of 8 male (%13) and 53 female (%87) biology teacher candidates. 36 (59%) of the teacher candidates in the sample group were first-year students while 25 (41%) of them were fifth-year (last year) students.

3.2. Data collection instruments

Data collection has been carried out based on the "Environmental education self-efficacy belief instrument" that was adapted to environmental education by Sia (1992) from the original Enoch & Riggs (1990) instrument. It was adapted for use in Turkish language by Savran & Çakıroğlu (2001). This instrument has two scales: the reliability coefficient for "Environmental education self-efficacy belief scale" was calculated as 0.90 while the reliability coefficient for the "Environmental education outcome expectancy scale" was found to be 0.75. The minimum score that a subject can get from this instrument is 23 and the maximum score is 115.

3.3. Data analysis

The analysis of data collected in this study has been processed using the SPSS software and the results have been computed in the form of frequency, arithmetic mean, standard deviation, and t-test.

4. Findings and explanations

What is the level of self-efficacy beliefs of prospective biology teachers in environmental education?

The level of self-efficacy beliefs of prospective biology teachers in environmental education for the sample group is given in Table 1.

Table 1. Descriptive statistical values for the levels of self-efficacy beliefs of prospective biology teachers in environmental education

Environmental self-efficacy points	N	Minimum	Maximum	\bar{X}	ss
	61	55.00	99.00	81.00	9.17

According to Table 1, the average score for self-efficacy beliefs of prospective biology teachers in environmental education was calculated to be $\bar{X}=81.00$. This calculated average is close to being considered over medium-level. It shows that the level of self-efficacy beliefs of prospective biology teachers in environmental education is high for the sample group.

2. Are there any sex differences in prospective biology teachers' self efficacy beliefs in environmental education?

Table 2 shows the t-test results for the self-efficacy beliefs of prospective biology teachers in environmental education for the sample group.

Table 2. t-test results for the self-efficacy beliefs of prospective biology teachers according to the variable of sex

Gender	N	\bar{X}	ss	sd	t	p
Female	8	81.03	13.15	59	.082	.93
Male	53	80.75	8.59			

As seen in Table 2, the self-efficacy belief score of female biology teacher candidates is $\bar{X}=81.03$, while the same score for male biology teacher candidates is $\bar{X}=80.75$. It is shown that the mean self-efficacy score of female biology teacher candidates is descriptively higher than the mean score of male candidates. According to t-test results, however, it has been found that the self-efficacy belief scores of female and male biology teacher candidates do not show any significant variation ($t_{(59)}=.0082$; $p>.05$).

3. Do the levels of self-efficacy beliefs of prospective biology teachers' in environmental education show significant correlation with the variable of the number of years in training?

Table 3 gives the t-test results of self-efficacy belief scores of prospective biology teachers according to the variable of the number of years in training.

Table 3. t-test results for the self-efficacy belief scores of prospective biology teachers according to the variable of the number of years in training

Grade	N	\bar{X}	ss	sd	t	p
1.	36	78.25	7.62			
5.	25	84.96	9.18	59	2.989	.00*

* $p<.05$

As shown in Table 3, the mean self-efficacy belief score of first-year biology teacher candidates has been determined to be $\bar{X}=78.25$, while the mean self-efficacy belief score of fifth-year candidates is $\bar{X}=84.96$. According to t-test results, it is understood that the mean self-efficacy belief scores of first-year and fifth-year biology teacher candidates show significant variation ($t_{(59)}=2.989$; $p<.05$). This statistical difference is found to be in favor of fifth-year teacher candidates.

4. Do the levels of self-efficacy beliefs of prospective biology teachers' in environmental education show significant correlation with the variable of membership to an environmental organization?

Table 4 shows t-test results of self-efficacy belief scores of prospective biology teachers according to the variable of membership to an environmental organization.

Table 4. t-test results for self-efficacy belief scores of prospective biology teachers according to the variable of membership to an environmental organization

Organizations	N	\bar{X}	ss	t	sd	p
Member	20	85.40	7.62	2,756	59	.00*
Not member	41	78.85	9.18			

* $p < .05$

As illustrated in Table 4, the self-efficacy belief score of teacher candidates who are members of environmental organizations is $\bar{X} = 85.40$, whereas the self-efficacy belief score of those who do not have membership to any environmental organizations is $\bar{X} = 78.85$. According to t-test results, the mean self-efficacy belief scores of teacher candidates who have membership to environmental organizations and the mean score of those who do not have membership to such organizations show significant variation ($t(59) = 2.756$; $p < .05$). This statistical difference is determined to be in favor of teacher candidates who are members of environmental organizations.

5. Discussion

According to the results of the study, it has been observed that the general level of self-efficacy beliefs of prospective biology teachers in environmental education is high. It has also been found that the level of self-efficacy beliefs of prospective biology teachers in environmental education is not affected by the variable of sex. In this respect, the results align with Aydın (2008); in his study on elementary school teacher candidates, it was found that their self-efficacy belief level was not significantly correlated with the variable of sex.

It has also been determined that the level of self-efficacy beliefs of prospective biology teachers relating to environmental education correlates significantly with the variable of class level, with the results favoring fifth-year teacher candidates. In the study by Altuğçekiç, Yaman & Koray (2005) conducted among elementary school, natural sciences, and mathematics teacher candidates; it was also observed that the level of self-efficacy beliefs of teacher candidates showed correlation with the variable of class level between first-year students and upper-class students.

Lastly, it has been found that the levels of self-efficacy beliefs of biology teacher candidates show significant variation between those who are members of environmental organizations and those who are not, with the results being in favor of teacher candidates who have membership in environmental organizations. Based on this, it can be deduced that the level of self-efficacy beliefs of teacher candidates in environmental education who spend more time in environment-related activities and gain relevant experience tend to be higher. Gardner (2009) has also indicated that elementary school teacher candidates with high levels of self-efficacy beliefs in environmental education have positive experiences in environment-related activities.

It can be concluded from the results of the study that it is necessary for teacher candidates who will assume important responsibilities in environmental education to gain more environment-related experiences. To this end, universities are recommended to organize environment-related events and activities on campuses targeting students, and that teacher candidates in these universities should be encouraged to attend these activities.

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